Synthesis and characterization of [4-(2,4-dichlorophenoxybutyrate)-zinc layered hydroxide] nanohybrid

ABSTRACT

A new layered organic–inorganic nanohybrid material in which an agrochemical, 4-(2,4-dichlorophenoxy)butyrate (DPBA) is intercalated into inorganic interlayers of zinclayeredhydroxide (ZLH) was synthesized by direct reaction of aqueous DPBA solution with zinc oxide. The resulting nanohybrid is composed of the organic moieties, DPBA sandwiched between ZLH inorganic interlayers. The nanohybrid afforded well ordered crystalline layered structure, a basal spacing of 29.6 Å, 23.5% carbon (w/w) and 47.9% (w/w) loading of DPBA. FTIR study shows that the absorption bands of the resulting nanohybrid composed the FTIR characteristics of both the DPBA and ZLH which further confirmed the intercalation episode. The intercalated organic moiety in the form of nanohybrid is thermally more stable than its sodium salt. Scanning electron micrograph shows the ZnO precursor has very fine granular structure and transformed into a flake-like when the nanohybrid is formed. This work shows that the nanohybrid of DPBA-ZLH can be synthesized using simple, direct reaction of ZnO and DPBA under aqueous environment for the formation of a new generation of agrochemical.

Keyword: Herbicides; [4-(2,4-dichlorophenoxybutyrate); Zinc layered hydroxide; Nanohybrid.